

Statement of Work (SOW)  
for the  
Advanced Integrated Electronic Warfare System  
(AIEWS)

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Prepared by:  
Program Executive Office, Theater Air Defense (PEO(TAD))  
Integrated Ship Defense Program Office

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# Table of Contents

Table of Contents	i
<b>1.0 SCOPE</b>	<b>1</b>
<b>1.1 BACKGROUND</b>	<b>1</b>
<b>1.2 SYSTEM DESCRIPTION</b>	<b>2</b>
1.2.1 Increment 1 Description	2
1.2.2 Increment 2 Description	2
<b>1.3 INFORMATION REQUESTS</b>	<b>2</b>
<b>1.4 USE OF EXISTING CORPORATE PLANS, POLICIES, AND PROCEDURES</b>	<b>3</b>
<b>2.0 REFERENCES AND DEFINITIONS</b>	<b>4</b>
<b>2.1 MILITARY SPECIFICATIONS</b>	<b>4</b>
<b>2.2 MILITARY STANDARDS</b>	<b>5</b>
<b>2.3 MILITARY HANDBOOKS</b>	<b>5</b>
<b>2.4 OTHER GOVERNMENT DOCUMENTS</b>	<b>5</b>
<b>2.5 COMMERCIAL STANDARDS</b>	<b>6</b>
<b>3.0 REQUIREMENTS</b>	<b>7</b>
<b>3.1 PROGRAM MANAGEMENT</b>	<b>7</b>
3.1.1 Cost as an Independent Variable (CAIV)	7
3.1.2 Integrated Product and Process Development (IPPD)	7
3.1.3 Integrated Management Plan (IMP)	8
3.1.4 Integrated Management Report (IMR)	8
3.1.4.1 Project Control Panel (PCP)	8
3.1.4.2 Contract Work Breakdown Structure (CWBS)	8
3.1.4.3 Integrated Master Program Schedule (IMPS)	8
3.1.4.4 Cost Control and Reporting	9
3.1.4.4.1 Contractor Cost Data Reporting	9
3.1.4.5 Risk Management and Reporting	9
3.1.5 Continuous Acquisition and Life Cycle Support (CALS)	10
3.1.6 Meetings and Reviews	10
3.1.6.1 In Process Reviews (IPRs)	10
3.1.6.2 Technical Reviews	10
3.1.7 AIEWS In Plant Technical Representative	11
3.1.8 Security and Privacy	11
<b>3.2 SYSTEMS ENGINEERING</b>	<b>12</b>
3.2.1 Systems Engineering Management Plan (SEMP)	12
3.2.2 Technical Performance Measures (TPMs)	13
3.2.3 System Modeling and Analysis	13
3.2.4 Wrap Around Simulation Program (WASP)	13
3.2.5 Design Options Analysis	13
3.2.6 Open System Architecture	13
3.2.6.1 Open System Performance Evaluation	14
3.2.6.2 Application Conformance Management	14
3.2.7 Technology Assessment and Insertion/Refreshment	14
3.2.8 System Design Documentation	14

3.2.8.1 System/Subsystem Specification Level Design	15
3.2.8.2 System/Subsystem Design Description Level Design	15
3.2.8.3 Development Specifications	15
<b>3.3 HARDWARE ENGINEERING</b>	<b>15</b>
3.3.1 Hardware Development Plan (HDP)	16
3.3.2 Hardware Design Documentation	16
3.3.3 Technical Data Package (TDP)	16
3.3.3.1 Technical Drawings	16
3.3.3.2 Installation Drawings	16
<b>3.4 SOFTWARE ENGINEERING</b>	<b>17</b>
3.4.1 Software Development Plan (SDP)	17
3.4.1.1 Interactive Electronic Technical Manual (IETM)	18
3.4.1.2 IETM Development	18
3.4.2 Software Design Documentation	18
3.4.3 Independent Verification and Validation	18
3.4.4 Software Maintenance Resources	19
<b>3.5 SPECIALTY ENGINEERING</b>	<b>19</b>
3.5.1 Specialty Engineering Management Plan (SpEMP)	19
3.5.1.1 Reliability and Maintainability (R&M)	19
3.5.1.1.1 R&M Management	19
3.5.1.1.2 R&M Analysis	20
3.5.1.1.3 R&M Testing	20
3.5.1.2 Human Engineering (HE)	20
3.5.1.2.1 Human-Machine Interface (HMI)	20
3.5.1.3 System Safety	21
3.5.1.3.1 Safety Hazard Elimination/Mitigation	21
3.5.1.3.2 Safety Tasks	21
3.5.1.3.3 Safety Support	21
3.5.1.3.3.1 WSESRB Support	22
3.5.1.4 Configuration Management (CM)	22
3.5.1.4.1 Configuration Identification	22
3.5.1.4.2 Configuration Control Forms	22
3.5.1.4.2.1 Class I Engineering Change Proposals (ECPs)	22
3.5.1.4.2.2 Class II ECPs and Minor RFD/Ws	23
3.5.1.4.2.3 Configuration Audits	23
3.5.1.4.2.4 Configuration Status Accounting (CSA)	23
3.5.1.5 Quality Assurance (QA)	23
3.5.1.6 Pre-Production Engineering	24
3.5.1.6.1 Manufacturing Planning	24
3.5.1.6.2 Producibility Analysis	24
3.5.1.7 Natural and Induced Environmental Compatibility (N&IEC)	24
3.5.1.8 Electromagnetic Environmental Effects (E <sup>3</sup> ) Control	25
3.5.1.9 Frequency Management	25
3.5.1.10 Continuous Environmental Assessment	25
<b>3.6 SYSTEM/SUBSYSTEM INTEGRATION</b>	<b>25</b>
3.6.1 System/Subsystem Integration Plan (S <sup>2</sup> IP)	26
3.6.2 Hardware/Software Interfaces	26
3.6.3 Hardware/Software Interface Control	26
3.6.3.1 Installation Control Drawings (ICDs)	26
3.6.4 External Interface Requirements and Design	26

3.6.5 Correction of Interface Problems.	27
<b>3.7 TEST AND EVALUATION (T&amp;E)</b>	<b>27</b>
3.7.1 Master Test Plan (MTP)	27
3.7.2 Government Witness of Tests	27
3.7.3 Test Procedures	28
3.7.4 Factory Qualification Testing	28
3.7.5 Land Based Testing	28
3.7.6 Shipboard Testing	28
3.7.7 Test Report Summaries	28
3.7.8 System Acceptance	28
<b>3.8 INTEGRATED LOGISTICS SUPPORT (ILS)</b>	<b>29</b>
3.8.1 Integrated Support Plan (ISP)	29
3.8.2 Logistics Management Information (LMI)	29
3.8.3 Reliability Centered Maintenance (RCM)	30
3.8.4 Level of Repair Analysis (LORA)	30
3.8.5 Maintenance Planning	30
3.8.5.1 Maintenance Concept	30
3.8.5.2 Planned Maintenance	31
3.8.5.3 Integrated Diagnostics	31
3.8.6 Supply Support	31
3.8.6.1 Provisioning Conference	31
3.8.6.2 Provisioning Lists	31
3.8.6.3 Supplementary PTDs (SPTDs)	31
3.8.6.4 Installation and Checkout (INCO) Kits	32
<b>3.9 TRAINING AND TRAINING SUPPORT</b>	<b>32</b>
3.9.1 Training Services	33
<b>3.10 INCREMENT 1 LRIP OPTION (Option I)</b>	<b>34</b>
3.10.1 Production Management	34
3.10.2 Production Engineering	34
3.10.3 Production Readiness Review (PRR)	34
3.10.4 Installation and Check Out (INCO)	34
<b>3.11 INCREMENT 2 E&amp;MD OPTIONS (Options II &amp; III)</b>	<b>35</b>
3.11.1 Technical Documentation	35
3.11.2 Increment 1 System Resources	35
3.11.3 Development Engineering	35
<b>3.12 INCREMENT 2 LRIP OPTIONS (Options IV &amp; V)</b>	<b>35</b>
3.12.1 Production Management	36
3.12.2 Production Engineering	36
3.12.3 Production Readiness Review (PRR)	36
3.12.4 Replenishment INCO	36
<b>3.13 INCREMENT 1 PRODUCTION OPTIONS (Options VI, VII &amp; VIII)</b>	<b>36</b>
3.13.1 Production Readiness Review (PRR)	36
3.13.2 Contractor Repair Depot (CRD) Operation	37
3.13.3 Replenishment INCO	37
<b>3.14 SOFTWARE SUPPORT ACTIVITY (SSA) OPTION (Option IX)</b>	<b>37</b>

<b>3.15 ENGINEERING SERVICES FOR TRAINING AND INSTALLATION OPTION (Option X)</b>	<b>37</b>
<b>3.16 DIRECT VENDOR DELIVERY (DVD) SUPPLY SERVICES (Options XI &amp; XII)</b>	<b>37</b>
3.16.1 Delivery Response Times	38
3.16.1.1 Issue Priority Group One	38
3.16.1.2 Issue Priority Group Two	38
3.16.1.3 Issue Priority Group Three	38
3.16.2 Parts Availability	38
3.16.3 Reporting	38
3.16.4 Inventory	38
3.16.5 Support Transition	39
<b>APPENDIX A: Acronyms &amp; Definitions</b>	<b>41</b>

## **1.0 SCOPE**

This Statement of Work (SOW) describes the design, fabrication, and Test and Evaluation (T&E) tasks needed for Engineering and Manufacturing Development (E&MD) of the U.S. Navy's next generation surface ship Electronic Warfare (EW) system, herein referred to as the Advanced Integrated Electronic Warfare System (AIEWS). The system requirements for this effort are specified in the performance specification referred to as the AIEWS Performance and Compatibility Requirements (P&CR) document dated 15 May 1997. AIEWS development will follow an incremental approach. This approach requires the Contractor to initiate E&MD for the entire AIEWS through the System Design Review (SDR). Following SDR, the Contractor will continue with the development of Increment 1 (Electronic Support (ES), Electronic Attack (EA) (offboard decoys only) and Control & Processing (CAP)). Increment 1, Low Rate Initial Production (LRIP); Increment 1, Production; Increment 2, Electronic Attack (EA) (onboard countermeasures) E&MD; and Increment 2, LRIP are options to the base work. Increment 1 will be capable of installation and operation independent of Increment 2. AIEWS will be required to operate with and interface to different combat systems (Integrated Ship Defense (ISD) and AEGIS Weapons System (AWS)). Candidate ships for AIEWS forward-fit are DDG-91 and above, CVN-77 and above, LPD-22 and above, all SC-21 ships and all land-based systems. Candidate ships for AIEWS back-fit are DDG-51 through DDG-90, LPD-17 through LPD-21, CG-52 through CG-73, LSD-41 through LSD-52, CVN-65, CVN-68 through CVN-76, and LHD-1 through LHD-7.

## **1.1 BACKGROUND**

Development of AIEWS as an integral element of the ship's combat system, use of open system standards and open architecture design, use of COTS/NDI components/subsystems to the maximum extent possible, and the incorporation of Government Furnished Property (GFP) are key development objectives of AIEWS. Other inherent system development objectives include supportability and logistics improvements using an integrated approach to maintenance, improved reliability/maintainability, embedded training, reduced manpower, and minimizing life-cycle cost.

A number of Government-sponsored efforts and advanced technology initiatives already completed have produced information of value to AIEWS development. These efforts have produced information and materials (which will be available to the Contractor for information purposes) that include:

- a. Advanced Technology Demonstrations (ATDs) that have demonstrated the technical feasibility of various AIEWS concepts.

- b. Navy-funded Broad Agency Announcement (BAA) contracts that produced draft system specifications which were based on subsystem performance trades and cost/risk analyses.
- c. Navy-funded risk reduction and SBIR developed technology insertion consisting of a Control and Processing (CAP) subsystem, including Human-Machine Interface (HMI) improvements.
- d. Government integration efforts with various combat systems, including external IRS development.

## **1.2 SYSTEM DESCRIPTION**

**1.2.1 Increment 1 Description.** Increment 1 initiates the full AIEWS design through the SDR and develops the hardware and software for a CAP and ES Engineering Development Model (EDM) that provides precision DF, Specific Emitter Identification (SEI), High Probability of Intercept (HPOI), and a High-Gain High-Sensitivity (HGHS) capabilities. Increment 1 will integrate with the MK 53 Decoy Launching System (DLS) and with the combat system. The Increment 1 design will include the interfaces needed to support integration of Increment 2 EA functions. Increment 1 implements all sections of the P&CR except paragraph 3.3.3. On all forward fit ships, the system's tactical displays and controls will be provided at a CS console; AIEWS will provide and receive display and control data through a CS Interface. On backfit ships the Contractor will use a standard combat system workstation to provide operator displays, and generic control and processing functions. The Government will provide, as GFE, the control and display consoles required for E&MD.

**NOTE:** The HGHS subsystem, which is to provide long-range situation awareness and extended horizon detection, will be specified in a separate document and separately procured, but will be fully integrated with AIEWS. The contractor shall also separately address the SC-21 requirements in the P&CR.

**1.2.2 Increment 2 Description.** Increment 2 incorporates onboard Radio Frequency (RF) and Infrared (IR) EA hardware and software, and cooperative onboard/offboard EA techniques. Increment 2 will require software builds to incorporate EA integration with ISD and AWS, and implements the EA section of the P&CR paragraph 3.3.3.

## **1.3 INFORMATION REQUESTS**

The Contractor is responsible for obtaining data needed to execute this contract, with the exception of items identified as Government Furnished Information/Property (GFI and GFP). Other Department of Defense/Military standards or specifications shall be obtained through normal distribution channels. Requests to the procuring activity for



such documentation shall not relieve the Contractor of any obligations under this contract.

#### **1.4 USE OF EXISTING CORPORATE PLANS, POLICIES, AND PROCEDURES**

The Contractor is encouraged to use existing corporate plans, policies, and procedures (as appropriate) in response to the AIEWS Contract Data Requirements List (CDRL) requirements. If existing documents fail to adequately address the requirements, the corporate documentation may be modified and submitted. Depending on the extent of the modifications, supplemental or errata sheets may be provided with the corporate documentation. The Contractor shall explicitly define the planned use of existing or modified existing items where appropriate in the proposal. A list of existing documents used, a description of modifications, and a description of how these meet CDRL requirements shall be prepared and submitted to the Government for review at the Post Award Conference. All deliveries should be made in electronic format. The Contractor shall define the software applications that will be used to meet these requirements (e.g., Microsoft Office, Microsoft Project, Ascent Logic's RDD-100 (or compliant), Continuous Acquisition & Life Cycle Support (CALS)-compliant applications, IETM development tools, etc.).

## 2.0 REFERENCES AND DEFINITIONS

The following specifications, standards, and handbooks form a part of this SOW to the extent cited herein. **All reference documents may be used for guidance unless otherwise specified within the body of this SOW. Guidance documents may be used as an aid in identifying applicable topics to be addressed consistent with meeting the requirements of the program. The Contractor is not required to use any document cited "for guidance" or "as guidance".** In keeping with the most recent Department of Defense (DOD) and Secretary of the Navy (SECNAV) policies, the Contractor should propose alternatives to the specifications and standards cited herein. Unless otherwise specified, the issue of Government documents are those listed in the issue of the Department of Defense Index of Specifications and Standards on the date of this SOW. The issue of non-Government standards are those in effect on the date of this SOW.

### 2.1 MILITARY SPECIFICATIONS

Specification	Requirement	Waiver	Description
MIL-T-31000A	Guidance	N/A	Technical Data Packages, General Specification For
MIL-PRF-28000A	Guidance	N/A	Digital Representation for Communication of Product Data: IGES Application Subsets and IGES Application Protocols
MIL-PRF-28001B	Guidance	N/A	Markup Requirements and Generic Style Specification for Electronic Printed Output and Exchange of Text
MIL-PRF28002	Guidance	N/A	Requirements for Raster Graphics Representations in Binary Format
MIL-PRF-28003	Guidance	N/A	Digital Representation for Communication of Illustration Data: CGM Application Profile
MIL-M-87268	Guidance	N/A	Performance Specification for Manuals, Interactive electronic Technical - General Content, Style, format, and User-Interaction Requirements
MIL-D-87269	Guidance	N/A	Military Specification for Data Base, Revisable Interactive Electronic Technical Manuals, For the Support of
MIL-P-24534A	Guidance	N/A	Preventive Maintenance System, Development of Maintenance Requirement Cards
MIL-PRF-49506	Guidance	N/A	Logistics Management Information

## 2.2 MILITARY STANDARDS

Standards	Requirement	Waiver	Description
MIL-STD-1521B	Guidance	N/A	Technical Reviews and Audits for Systems, Equipments and Computer Software
MIL-STD-961D	Guidance	N/A	DOD Standard Practice, Defense Specifications
MIL-STD-882C	Invoked	X	System Safety Program Requirements
MIL-STD-196D	Guidance	N/A	Joint Electronics Type Designation System
MIL-STD-973	Guidance	N/A	Configuration Management
MIL-STD-1379D	Guidance	N/A	Military Training Programs
MIL-STD-1840B	Guidance	N/A	Automated Interchange of Technical Data

## 2.3 MILITARY HANDBOOKS

Handbooks	Requirement	Waiver	Description
S90981-AB-GIB-010/MAINT	Guidance	N/A	RCM Handbook

## 2.4 OTHER GOVERNMENT DOCUMENTS

Documents	Requirement	Waiver	Description
DOD Regulation 5000.2-R Appendix VI	Invoked	N/A	Department of Defense Regulation - Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs
9470-002-A-X-C	invoked/SOW takes precedence	N/A	PEO(TAD) Configuration Management Plan for SSD Programs
NAVSOP 6071	Guidance	N/A	Best Practices for Manufacturing Planning
DOD ST821-AG-PRO-010	Guidance	N/A	AN/USM-646(V) Gold Disk Development Procedures
STANAG 4404	Guidance	N/A	Safety Design Requirements and Guidelines for Munition Related Safety Critical Computing Systems, NATO AC/310 Ad Hoc Working Group on Munition Related Safety Critical Computing Systems
S0005-AD-PRO-010	Guidance	N/A	IETM Process Plan
DD Form 1494	Guidance	N/A	Frequency Management
AIEWS P&CR dated 12 May	Invoked	N/A	PEO(TAD)D Performance & Compatibility Requirements

1997			(P&CR)
GP&P 95-06	Guidance	N/A	SW Development

## 2.5 COMMERCIAL STANDARDS

Standards	Requirement	Waiver	Description
IEEE J-STD-016	Guidance	N/A	Standard for Information Technology Software Life Cycle Processes Software Development Acquirer-Supplier Agreement
IEEE-STD-200	Guidance	N/A	Reference Designations For Electrical and Electronics Parts and Equipment
EIA/IS-632	Guidance	N/A	System Engineering
ASME Y14.24M	Guidance	N/A	Types and Applications of Engineering Drawings
ANSI/ASQC Q9001	Guidance	N/A	Quality Systems Model for Quality Assurance in Design Development, Production, Installation & Servicing
ASTM F-1337-91	Guidance	N/A	Human Engineering

### 3.0 REQUIREMENTS

The Contractor shall design, fabricate, integrate, document, test, and install the AIEWS Engineering Development Models (EDMs) to meet the requirements of this SOW and the AIEWS P&CR. The Contractor shall integrate CAP GFP software and provide support through formal Government testing (e.g., Developmental Testing (DT) and Operational Testing (OT)). The Government will provide the CAP design documentation and source code to the Contractor with the right to use it only on the AIEWS program. The CAP GFP will be provided at the times specified in the AIEWS P&CR Appendix F.

**3.1 PROGRAM MANAGEMENT.** The Contractor shall perform program management tasks needed to efficiently execute the requirements of this contract. The Contractor shall provide the following data/information requests as part of the integrated Program Management deliverable. This deliverable shall encompass all program management planning, organizing, staffing, directing, and controlling efforts.

**3.1.1 Cost as an Independent Variable (CAIV).** The Contractor shall operate within a management and design environment that encourages effective life-cycle cost control. The Contractor shall employ methods in the management and design process, including the development, implementation, and maintenance of a life-cycle cost model, that is conducive to life-cycle cost reduction.

**3.1.2 Integrated Product and Process Development (IPPD).** The Contractor shall apply a systematic approach to the integrated, concurrent development of the products and processes applicable to the development and production of AIEWS. In support of IPPD, Integrating Integrated Product Teams (IIPTs) shall monitor and oversee the activities of the Integrated Product Teams (IPTs) formed at different times during the life of the contract. The IIPT will be chaired by the Government with representation from both the Government and Contractor. IPTs shall be formed and be composed of both Government and Contractor members/participants. The Contractor shall actively participate in Government-lead IPTs, and form Contractor-lead IPTs as required during the life of the contract. The role of Government members/participants on Contractor-lead IPTs is to be a working member of the team by providing Government insight and information within the scope of the contract. All IPTs will be product-based, multi-disciplined, strive for consensus, and kept to a minimum number of members/participants. The formation of an IPT shall require that a charter be submitted to the Government-lead AIEWS IIPT for approval. An IPT charter shall be drafted for each IPT and shall include objectives, empowered membership, roles and responsibilities, product(s), schedule, and reporting, at a minimum. Risk identification and assessment shall also be an integral part of IPT activities. The IPPD/IPT approach shall not relieve the Contractor of the responsibility of meeting the requirements of the contract.

**3.1.3 Integrated Management Plan (IMP).** The IMP shall provide the management structure for orderly, controlled, and efficient execution of this contract. The IMP shall cover the execution of the base effort with provisions for potential follow-on implementation of the options. The IMP shall describe the relationship between the IMP and other major documentation. The IMP shall provide a description of the Contractor's management structure, organizational responsibilities, system development approach, and Government interfaces, including the role of IPTs, needed in the execution of this contract.

**3.1.4 Integrated Management Report (IMR).** The IMR shall include an integrated Project Control Panel, Contract Work Breakdown Structure (CWBS), Integrated Master Program Schedule (IMPS), and Cost and Risk Reports. The Contractor shall provide IMRs to the Government on a monthly basis.

**3.1.4.1 Project Control Panel (PCP).** A PCP shall include summary management metrics that enable the project status to be monitored. The Contractor shall use the Software Acquisition Best Practices as guidance in developing a PCP tailored to the specific reporting needs of the program as the program evolves. For example, the PCP may include a "roll-up" graphical summary of: Cumulative Earned Value (EV), Cumulative Months, and Cumulative Dollars; Cost Performance Index (CPI), To-Complete Performance Index (TCPI), and Efficiency vs. Time; Task Completion and Quality Gates Progress; Aggregate Schedule Overrun and Aggregate Requirements Growth; Voluntary Staff Turnover and Overtime Hours; Defects by Activity (Requirements, Design, Coding, Test, etc.); Risk Impact, Cost and Schedule Risk Liability; etc.).

**3.1.4.2 Contract Work Breakdown Structure (CWBS).** Based on the Government-provided Work Breakdown Structure, the Contractor shall develop and maintain an extended CWBS which provides visibility/accountability to at-least two levels below the level which is being reported. The extended CWBS shall be to the lowest level necessary to reflect the way the work is being performed, while ensuring correlation of these lower level tasks to the P&CR, Contract Line Item Numbers (CLINs), configuration items, data items, and work statement tasks. The CWBS shall be the key reference document for planning, controlling, and reporting requirements. The Contractor shall ensure subcontractor data supports the prime contract CWBS. The Contractor shall maintain this CWBS, use it as the basis for defining all tasks associated with the program, and maintain traceability of all Contractor efforts to the elements of the CWBS. The Contractor shall establish and maintain traceability of hardware and software Configuration Items (CIs) during the program using the CWBS codes, cost reports, and the Integrated Master Program Schedule (IMPS).

**3.1.4.3 Integrated Master Program Schedule (IMPS).** In accordance with the IMP, the Contractor shall develop an overall IMPS for program control, status monitoring, and

reporting purposes. The IMPS shall identify major tasks/efforts and associated timeframes needed to execute the contract. The IMPS shall be traceable to and integrated with all elements of the CWBS and cost/funding. The IMPS, at a minimum, shall include details on the major functional elements described in the CWBS. The IMPS shall be developed using a "roll-up" scheme from lower-level (more detailed) schedules. The IMPS shall include appropriate task constraints and sequencing to support Critical Path Method (CPM) analysis and display. The IMPS shall be developed using non-proprietary commercial software fully compatible with Microsoft Project for Windows.

**3.1.4.4 Cost Control and Reporting.** The Contractor shall use the general requirements described in DOD Regulation 5000.2-R, including the mandatory procedures described in Appendix VI therein. Guidelines of DOD 5000.2-R (Section 6.4) shall be used to establish cost reporting requirements for subcontractors. Cost reporting shall be limited to CWBS level 3, except in special interest areas determined by the Government. The Contractor shall prepare and deliver Cost Performance Reports (CPRs) for the basic contract and each exercised option. Each CPR shall provide traceability to the CWBS and IMPS. The reporting and visibility of cost reporting shall be consistent with work package/work assignments identified in the Contractor's extended CWBS. The work/planning package level is that level at which earned value is determined, schedule status is assessed, and critical path is determined. The Contractor shall also develop and maintain a method for updating and forecasting contract fund requirements. The Contractor shall provide the Government access to all pertinent data, records, and work package planning to support cost reporting calculations.

Upon exercising any of Options XI or XII, the Contractor shall prepare and submit an annual pricing report not later than 1 March to include National Stock Number, New Item Unit Price and Repaired Item Unit Price. New Item Unit Price is the price for non-repairable (consumables) and repairables requisitioned without a returned carcass. The Repaired Item Unit Price is the price for repairables which should be based on receiving a returned carcass at a return rate of 95%.

**3.1.4.4.1 Contractor Cost Data Reporting (CCDR).** The Contractor shall provide a separate CCDR using DD Form 1921 and DD Form 1921-1 for Increment 1 E&MD and LRIP, and Options for Increment 2 E&MD and LRIP, and each Increment 1 production lot. Accompanying each CCDR submission, the Contractor shall include a report which shows how the accounting system relates to the DD Form 1921 and DD Form 1921-1 format. The report shall include: (1) a listing of which cost accounts are included in each WBS element; (2) a mapping for each WBS element that shows how the functional elements relate to the functional categories of the DD Form 1921-1.

**3.1.4.5 Risk Management and Reporting.** The Contractor shall maintain a risk management program to assess the risks associated with program cost, schedule, and

achievement of technical requirements. Specific risk management functions as outlined in the IMP shall include, at a minimum: 1) Identify known and potential risks; 2) Assess risks, including a relative ranking by program impact, and establish critical thresholds; and 3) Define methods or alternatives to mitigate or minimize these risks, including the identification of criteria upon which a programmatic decision must be made to initiate alternatives or make other programmatic changes. This plan will be presented to the Government for approval and concurrence with risk area assessments and thresholds, with monthly update and presentation at in-process and technical reviews.

The Contractor shall be responsible for continually monitoring risk. If a risk identified is projected to exceed a critical threshold impacting program cost, schedule, or achievement of technical requirements, the Contractor shall immediately report said risk, mitigation plan, and alternatives to the Government for approval and direction.

**3.1.5 Continuous Acquisition and Life Cycle Support (CALS).** The Contractor shall establish a single, centralized, and CALS-compliant system for management of all data required under this contract. The Contractor shall provide online access to, or delivery of, their programmatic and technical data in native digital form. The Contractor shall describe in the IMP plans for providing an integrated digital data environment that supports the deliverables for this contract.

**3.1.6 Meetings and Reviews.** A meeting will be held with the Contractor after contract award to review and clarify tasking details, including data item requirements. At a minimum, the meeting will provide a forum for technical clarifications and discussions, classification issues, schedules, and the Contractor's start-up and staffing plans. The meetings/reviews described in the subsequent paragraphs shall form the basis for formal programmatic/technical reviews between the Government and Contractor.

**3.1.6.1 In Process Reviews (IPRs).** The Contractor shall coordinate with the Government to schedule and conduct IPRs on a quarterly basis. As part of this coordination effort, the Contractor shall submit a draft IPR agenda to the Government for approval. At a minimum, the specific content of each review shall address program management (including CAIV progress and initiatives) and engineering progress and risks. These reviews shall be conducted with the Government at the Contractor's facility, or at some other mutually agreeable site. The Government shall have the right to omit any meeting or require additional meetings to be scheduled at critical points in the program. The Contractor shall implement a Government-approved process for preparing IPR summary reports which also address and/or respond to action items.

**3.1.6.2 Technical Reviews.** The Contractor shall plan, conduct, and record the technical reviews listed below. The technical review meetings shall represent executive-level presentations summarizing program status and issues as well as the results of technical IPT efforts. These reviews are expected to be conducted with the Government



at the Contractor's facility, or at some other mutually agreeable site. The Contractor shall coordinate with the Government to schedule and conduct technical reviews at key milestones in the development process. As part of the coordination effort, the Contractor shall submit draft agendas, using MIL-STD-1521B as a guide, to obtain a description of topics to be covered at each review. The Contractor shall provide an overview description of the objectives/purpose of the review and approvals to be requested at each review. The Contractor shall implement a Government-approved process for addressing and responding to technical review action items. Each technical review shall present cost vs. performance vs. schedule trades as the design evolves. If the Government concludes that either the review was incomplete or if an excessive number of action items were generated and remain unresolved, the Contractor shall schedule follow-on technical reviews. The Contractor shall prepare and submit summary reports for all technical reviews. The technical reviews to be conducted by the Contractor include:

- System Requirements Review (SRR)
  - Review of preliminary Functional Configuration Documentation (FCD)
- System Design Review (SDR)
  - Review of preliminary Allocated Configuration Documentation (ACD)
- Software Specification Review (SSR)
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
  - Review of preliminary Production Configuration Documentation (PCD)
- Test Readiness Review (TRR)
- Production Readiness Review (PRR)

**3.1.7 AIEWS In-Plant Technical Representative.** The Government intends to establish an AIEWS In-Plant Technical Representative Office at the Contractor's facility. The technical representative shall be provided in-plant office space of at least 144 ft<sup>2</sup>, available on a daily basis, and suitable for storing classified material (Confidential and Secret). The office space shall be lockable and separate from Contractor office spaces. The space shall be soundproof, be provided with at least two phone lines, and be serviced by janitorial services. The Government will maintain the office throughout the performance of the contract. The Contractor shall make the offices available within 30 days after contract award. The office shall contain standard office equipment (desks, chairs, telephones, and a safe for storing classified information up to and including Secret) and office supplies.

**3.1.8 Security and Privacy.** Security guidance shall be in accordance with OPNAVINST 5510.1H, SECNAVINST 5239.2, and the AIEWS Contract Security Classification Specification, DD Form 254, Revision 01, dated 5 June 1997. The system shall contain no data, hardware, or software which exceeds the Secret level. Security information shall be provided to the operator (e.g., security classification level of the

software during system initialization, handling instructions for diagnostics and system library data, hardware and software handling instructions in event of system failure, and instructions in the system declassification process). Classified hardware and software shall not reside in accessible spaces that are not continually attended by appropriately cleared personnel. The system design shall eliminate or minimize the need to pass classified data over local access networks. If there is a need to pass data over non-secure local networks, the data shall be encrypted. AIEWS shall maintain operator privacy data (e.g., operator training and skill proficiency data) while allowing data access to appropriately approved personnel and preventing data access to unauthorized personnel.

**3.2 SYSTEMS ENGINEERING.** The Contractor shall perform systems engineering tasks needed to ensure compliance of the system with the requirements in the P&CR, and as described in the following.

The Contractor shall document system-related efforts as the development effort evolves. The systems engineering document shall integrate planning, requirements/specification, design, integration, and testing data/information. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes; it is a “living document” meant to facilitate value-added data/information needed to document the design evolution. The systems engineering document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key systems engineering efforts. The final integrated systems engineering document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option exercise.

**3.2.1 Systems Engineering Management Plan (SEMP).** The Contractor shall develop, document in the systems engineering document, maintain, and adhere to a Government-approved SEMP. The SEMP shall be developed using Appendix A of EIA/IS-632 as guidance, or the Contractor may provide an alternative approach with supporting rationale which may exclude tasks which do not add value. The Contractor shall describe how the various technical inputs are integrated and how multi-disciplinary teamwork will be ensured. The SEMP shall provide comprehensive detail on how a fully integrated engineering effort will be managed and conducted during the design, development, integration, test, and installation of AIEWS. The SEMP shall present the methods, practices, and procedures used to manage and integrate the hardware, software, and specialty engineering activities into a structured systems engineering effort. The SEMP shall describe the entire AIEWS design process and provide detail on the engineering, technical, support, and programmatic efforts from development through production.

**3.2.2 Technical Performance Measures (TPMs).** The Contractor shall identify, track, and validate TPMs as part of the IMR, and may use EIA/IS-632 as guidance. The Contractor shall include: 1) Appropriate level of detail needed to obtain visibility of technical tasks and associated risks for all TPMs; 2) Response time to correct problems; and 3) Other metrics needed to develop and maintain technical performance profiles. The Contractor shall update TPM reports on a monthly basis and shall present TPM status during technical reviews.

**3.2.3 System Modeling and Analysis.** The Contractor shall conduct modeling and analyses as part of their systems engineering design process. The Contractor shall use these models to functionally design, budget (e.g., resource utilization, timing, reliability, etc.), allocate to HWCI and CSCIs, track, and demonstrate compliance to the technical requirements. The Contractor shall use these models to decompose the source requirements, derive related requirements, predict system performance, and assist in integration and test criteria development. The Contractor shall provide results of modeling and analyses efforts during technical reviews, and document as part of the specialty engineering document.

**3.2.4 Wrap Around Simulation Program (WASP).** The Contractor shall develop, validate, and utilize a WASP which will fully simulate the AIEWS electrical/digital/RF operating environment. The simulation shall allow for laboratory evaluation and prediction of system performance, performance assessment, planned improvements, benefit analysis, and maintenance of the system. The Contractor shall use COTS/NDI simulation software to the maximum extent possible. The simulation will provide those input, output, and processing functions necessary to simulate interfaces to the Combat System and Ship System elements necessary for AIEWS to simulate operation in a laboratory environment. Prior to formal delivery of the first EDM, the Contractor shall provide engineering baselines of the simulation system.

**3.2.5 Design Options Analysis.** As part of the systems engineering design effort, the Contractor shall establish a means of ensuring the visibility of detailed design options by providing in-depth trade studies which are based on operational capability and suitability vs. costs and schedule. The SEMP shall describe the process for identifying trade studies to be conducted. The Contractor shall document trade studies as part of the system engineering document. The Government must approve the implementation of trade study recommendations before they are implemented.

**3.2.6 Open System Architecture.** To support an open system architecture (hardware and software), the Contractor shall perform and document as part of the systems engineering document trade studies on open system interface standards and products being considered for use. The Contractor shall justify product/design selections and provide supporting documentation as technical reports for presentation to the Government for approval prior to proceeding with design. In the event that the

interfaces and/or products selected do not meet AIEWS requirements, the Contractor shall be prepared to provide technical and programmatic data necessary for obtaining any required waivers. The Contractor shall perform or witness/verify requisite testing to ensure conformance to open system interface standards.

**3.2.6.1 Open System Performance.** The Contractor shall document the criteria for evaluating open system performance in the SEMP. The Contractor shall consider, at a minimum: 1) Portability; 2) Interoperability; 3) Maintainability; 4) Vendor Independence; 5) Technology Insertion/Refreshment; 6) Compatibility with other products; 7) Reusability; 8) Scalability; 9) Expandability, and 10) Improved user productivity as candidate criteria. The Contractor shall continually evaluate products through market analyses and trade studies in accordance with the approved SEMP.

**3.2.6.2 Application Conformance Management.** The Contractor shall document in the SEMP the approach (i.e., processes, methods, and tools) to managing application conformance to ensure that the benefits of selecting products which conform to open system standards and profiles are maintained throughout the development process.

**3.2.7 Technology Assessment and Insertion/Refreshment.** The Contractor shall assess the state of current technology, project future technology trends, compare current and projected technology with design plans, and identify potential areas for technology refreshment. The Contractor shall implement a technology refreshment program to ensure that Contractor-furnished subsystems are not technologically obsolete, and continually evaluate, document as part of the systems engineering document and implement initiatives which reduce the system's life-cycle cost. The Contractor shall maintain a technology refreshment catalog as part of the systems engineering document which identifies components at risk for technological obsolescence and outlines the Contractor's plan to incorporate technologically current components. The Contractor shall ensure that technology refreshments incorporated do not degrade performance or decrease subsystem flexibility, reliability, maintainability or availability of the Contractor-furnished subsystems. The Contractor shall address the technology assessment and refreshment plans in the SEMP. The contractor shall demonstrate technology refreshment by porting software to other generation COTS/NDI or firmware and/or hardware platform components which conform to open systems standards. This demonstration shall port EDM software and shall be completed before committing to the production system configuration.

**3.2.8 System Design Documentation.** The Contractor shall document the system requirements and design, showing full traceability to the P&CR. MIL-STD-961D provides guidance on format, content, and procedures for different types of specifications and specification-like documents. The performance and detail specifications prepared for this contract are to be Program Unique Specifications (guidance contained in Appendix A of MIL-STD-961D), unless otherwise directed. The

performance, design, and test requirements shall be traceable through each level of specificity. COTS/NDI requirements are to be fully developed. These specifications shall be of sufficient detail to permit design, production, and evaluation of the end item. All specifications shall be kept current for the duration of the contract and maintained as part of the systems engineering document.

**3.2.8.1 System/Subsystem Specification Level Design.** The Contractor, in conjunction with the Government, shall develop a system level design that defines, at a minimum, the system functionality, performance, qualifications, and interface requirements that are decomposed and/or derived from Government source documents. This system level design shall be incorporated as part of the systems engineering document to be available prior to the System Requirements Review (SRR) and shall be baselined following its approval by the Government.

**3.2.8.2 System/Subsystem Design Description Level Design.** The Contractor shall, at a minimum, provide a description of the system architecture and allocated HWCIs/CSCIs that evolved from the system level design. This design description shall be available as part of the system engineering document for Government review prior to the System Design Review (SDR) and shall be baselined following its approval by the Government.

**3.2.8.3 Development Specifications.** The system engineering design/document shall be decomposed into more specific and detailed hardware, software, and interface development specifications as identified in the following sections. These specifications shall more clearly define the design as individual configuration items.

**3.3. HARDWARE ENGINEERING.** The Contractor shall develop and integrate (including GFP) the hardware necessary to meet the requirements of this contract. As part of the hardware engineering effort, the Contractor shall establish a means of ensuring the visibility of detailed hardware design options by providing in-depth trade studies. The Government shall approve the implementation of trade study recommendations.

The Contractor shall document hardware-related efforts as the development effort evolves. The hardware engineering document shall integrate planning, requirements/specification, design, integration, and testing data/information. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes, but is meant to facilitate value-added data/information needed to document the design evolution. The hardware engineering document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key hardware efforts. The final integrated hardware engineering document shall be delivered to the Government at the

completion of the E&MD phase or, if requested, prior to Option exercise.

**3.3.1 Hardware Development Plan (HDP).** The Contractor shall prepare an HDP that describes the design, development, fabrication, procurement, and testing of the AIEWS HWCI's allocated from the SSDD-level design. The hardware design process shall consider electrical, mechanical, software compatibility, MPT, and environmental/safety factors. The Contractor shall define COTS/NDI integration within the design and to what level it will be documented. The HDP shall address the transition from development to production, long-term production, and graceful introduction of upgrades. The hardware design effort shall be treated as an integral part of the overall system engineering process. The HDP shall describe the process for identifying trade studies to be conducted. The HDP shall be updated and made available for Government review as part of the hardware engineering document as the hardware design progresses.

**3.3.2 Hardware Design Documentation.** The SSDD-level design shall be decomposed into more specific and detailed hardware specifications. These specifications shall be part of the HDP and provide design requirements that clearly define the HWCI's. The Contractor shall develop test and acceptance criteria for each HWCI to demonstrate their performance and design robustness.

**3.3.3 Technical Data Package (TDP).** All production representative-level drawings and associated lists (including commercial) that support procurement shall be provided in the TDP. Electronic documentation (e.g., CAD and 3-D CAD models in CALS-compliant and in native format, etc.) shall also be delivered as part of the TDP. The TDP shall become the property of, and CM-controlled by, the Government following the appropriate Government audit or, if requested, prior to Option exercise.

**3.3.3.1 Technical Drawings.** The Contractor shall develop and provide technical drawings as part of the hardware engineering document that fully disclose the hardware and electrical/electronic design. The Contractor shall prepare CALS-compliant drawings that support the production and manufacture of HWCI's may use MIL-T-31000A and ASME Y14.24M as guidance. COTS/NDI items shall be documented to a level of detail needed to support product specification analysis and procurement. All drawings shall be updated prior to a scheduled IPR and/or technical review.

**3.3.3.2 Installation Drawings.** The Contractor shall prepare installation drawings as part of the hardware engineering document which meet the requirements for forward-fit and back-fit ships. The drawings shall define the physical interface between AIEWS and the host ship. The physical interface requirements shall include weight, space, foundations, electrical power, cabling/ connectors, heating, ventilation, air conditioning, and other environmental needs.

**3.4 SOFTWARE ENGINEERING.** The Contractor shall develop and integrate (including CAP GFP) the computer programs necessary to meet the requirements of this contract. The software development process shall be based on IEEE J-STD-016 and shall be consistent with the PEO(TAD) Software Development Policy (GP&P 95-06). Existing COTS/NDI software may be used intact as long as it is compatible with the architecture and meets the requirements of AIEWS. The AIEWS software design shall be scaleable and support open system architecture interfaces to a fully capable AIEWS (including all Options) and to other existing and future systems. Particularly, the software must fully integrate with CAP, AWS, ISD, and other systems as specified by the P&CR. Software simulations, code, tools, and devices developed by the Contractor in support of AIEWS development, integration, and test shall be delivered to the Government (Firmware is considered software and should be treated accordingly in development efforts). The Contractor shall support a Capability Maturity Model (CMM) Audit within the first 90 days after the award of the contract. The Government will provide a minimum notice of 48 hours prior to the audit.

The Contractor shall document software-related efforts as the development effort evolves. The software engineering document shall integrate planning, requirements/specification, design, integration, and testing data/information. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes, it is a “living document” meant to facilitate value-added data/information needed to document the design evolution. The software engineering document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key software efforts. The final integrated software engineering document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option exercise.

**3.4.1 Software Development Plan (SDP).** The Contractor shall prepare an SDP and shall adhere to, and maintain the Government-approved SDP that defines the software design and development process. The SDP shall address operational, diagnostic, support/utilities, training and IETM CIs. The SDP shall identify the resources, facilities, personnel, development schedule and milestones, and software tools required to develop, integrate, and test the CSCIs. The SDP shall include the Contractor’s Software Metrics Plan (linked to the PCP part of the IMR), Software Process Improvement Plan, Software Verification and Validation Plan, and Software Transition Plan. The SDP shall be updated as part of the software engineering document as the program progresses and as required to document software development design/process changes. The Contractor shall show how or if the content of documents traditionally provided under MIL-STD-2167 will be covered in the SDP. The Government will review the SDP at technical reviews and IPRs.

**3.4.1.1 Interactive Electronic Technical Manual (IETM).** The Contractor shall develop and document an IETM design as part of the software engineering document, and shall describe how the Contractor plans to manage and implement the development of the IETM in the SDP. The Government will review and approve the plan as required for implementation by the Contractor. The plan shall include:

- Procedures to ensure the development of a technically accurate and complete IETM to support operation, training, maintenance, or depot repair of the system, subsystems, or LRUs.
- V&V planning that reflects compatibility with the overall maintenance and support plan, details the anticipated schedule for the IETM, and outlines the Contractor's recommended V&V procedures. An IETM Validation Certificate shall be prepared by the Contractor.
- Processes and considerations for incorporation of any COTS/NDI manuals.
- Transition planning that identifies the hardware and software resources required for transferring to the Navy the ability to develop, test, verify, and implement future AIEWS IETM changes.

**3.4.1.2 IETM Development.** The Contractor shall develop at minimum a Class 4 IETM that supports organizational level maintenance, and operational and maintenance training. The IETM shall be an embedded function of Integrated Diagnostics, training, and system operation. IETM development shall be in accordance with the IETM Development Plan and shall use applicable elements of NAVSEA document S0005-AD-PRO-010. The Navy Advanced Technical Information Support (ATIS) system shall be used where applicable in the development of the IETM.

**3.4.2 Software Design Documentation.** The Software Design Documentation shall evolve with the Contractor software design and shall be part of the SDP. The Contractor shall document the management, design, and support of the software/firmware/databases utilized in AIEWS, its support systems, and simulations. The Contractor shall develop Software Requirements Specification(s) (SRSs) and Software Design Description(s) (SDDs) for each CSCI. The documentation shall include source code, executables, and listings as part of the Software Product Specification (SPS). Revisions to the system, support system software and documentation shall be controlled and documented as identified in the CM Plan. Each software release shall be accompanied by a Version Description Document (VDD).

**3.4.3 Independent Verification and Validation (IV&V).** The Contractor shall be subject to monitoring by a Government-appointed Independent Verification and Validation agency. The Contractor shall support the IV&V process. For all developed software, the Contractor shall maintain the status of all assigned IV&V-identified problems, and report their status during technical reviews and/or IPRs, and document as part of the software engineering document. The status report shall identify the



problem by Problem Report (PR) number, report resolution, mitigation, and issues related to the PR. The degree of compliance of the system software to the Government-approved SRS shall be assessed and presented at IPRs and technical reviews.

**3.4.4 Software Maintenance Resources.** As part of the SDP, the Contractor shall develop a software transition plan that will identify the resources required to develop, modify, design, test, verify, and implement future AIEWS software changes. Resources include items required to simulate AIEWS and its interfaces.

**3.5 SPECIALTY ENGINEERING.** The Contractor shall perform and document in the Specialty Engineering Management Plan (S<sub>P</sub>EMP) specialty engineering tasks needed to comply with the performance requirements of the P&CR and the tasks as described in the following.

The Contractor shall document specialty engineering-related efforts as the development effort evolves. The specialty engineering deliverable document shall integrate planning, requirements/specification, design, integration, and testing data/information. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes, it is a “living document” meant to facilitate value-added data/information needed to document the design evolution. The specialty engineering document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key system, hardware, and software efforts. The final integrated specialty engineering document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option exercise.

**3.5.1 Specialty Engineering Management Plan (S<sub>P</sub>EMP).** The Contractor shall develop, maintain, and adhere to the S<sub>P</sub>EMP which will be provided as part of the specialty engineering document. The Contractor shall describe how the various specialty engineering technical inputs are integrated into the systems engineering process, describing how multi-disciplinary teamwork will be ensured.

**3.5.1.1 Reliability and Maintainability (R&M).** The Contractor shall, at a minimum, conduct the R&M tasks specified herein to ensure that the AIEWS design complies with the R&M requirements specified in the AIEWS P&CR.

**3.5.1.1.1 R&M Management.** R&M shall be an integral part of the AIEWS systems engineering process, focusing on maximizing BIT effectiveness and minimizing external test equipment dependence. Details on R&M management processes, analyses, and tests shall be explained in the S<sub>P</sub>EMP and addressed, as applicable, in the monthly Integrated Management Report and its associated elements. As part of the Corrective Action System, the Contractor shall integrate failure reporting, failure analysis, and

feedback of corrective actions into the design, manufacturing, and test processes for all failures that occur during the contract. At a minimum, the level of failure reporting shall include development, qualification (including DT/OT), and factory verification testing at the system and major subassembly levels. In addition, the Contractor shall integrate their parts control engineering policies throughout the contract.

**3.5.1.1.2 R&M Analyses.** The Contractor shall perform R&M allocations, modeling, predictions, failure modes, effects, and criticality analyses (FMECAs), electronic stress analyses, worst case tolerance analyses, and testability analyses. The results shall be documented as part of the specialty engineering document, be integrated to support the hardware and software development, and reported at all program and design reviews.

**3.5.1.1.3 R&M Testing.** Included as part of the AIEWS Master Test Plan (MTP), the Contractor shall incorporate Reliability Development/Growth Testing (RD/GT) using the Test, Analyze and Fix (TAAF) process in which the systems and subsystems are tested under actual or simulated operational conditions for the purpose of disclosing design deficiencies and defects. COTS/NDI hardware proposed for the AIEWS design shall be subjected to Reliability Qualification Testing (RQT) when the particular hardware has not been used under the worst case environments defined by the AIEWS P&CR and when there is not sufficient analytical data to support the hardware's allocated reliability to comply with the overall system reliability. The contractor shall conduct formal BIT Verification tests at each subsystem level, as well as a Maintainability Demonstration (MDEMO). The Contractor shall train Navy personnel as the technician for the demonstration to be conducted onboard a ship in conjunction with DT/OT. Contractor defined Environmental Stress Screening (ESS) shall also be incorporated in the test program. At a minimum, ESS shall be conducted on all hardware (including spares) beginning with hardware used for qualification testing.

**3.5.1.2 Human Engineering (HE).** The Contractor shall establish and conduct an HE effort which conforms to a tailored ASTM F-1337-91 and shall prepare a Human Engineering Program Plan (HEPP) as part of the S<sub>P</sub>EMP. In the absence of a tailoring agreement ASTM F-1337 shall apply in its entirety. The Contractor shall develop and apply HE to all areas of human-machine integration, information flows, operator tasks, and maintenance tasks, installation tasks, including, but not limited to preventive and corrective maintenance, calibration, and alignment. HE shall be concurrent with the design of all elements of the system, both hardware and software, having an interface with the operator, maintainer, or trainee. The Contractor shall ensure that data products of HE analyses are incorporated into the appropriate analytic activities (e.g., LMI and Hardware and Manpower (HARDMAN) analyses) to avoid duplication of efforts.

**3.5.1.2.1 Human-Machine Interface (HMI).** The Contractor shall make use of available studies, prototypes, and other GFI in developing the HMI design. The Contractor shall

conduct and document in the specialty engineering document a structured HMI design that considers detailed functional requirements, the capabilities and involvement of shipboard operators and maintainers, consistency with evolving Combat System displays, consistency with the CSFAB-approved style guide, and state of the art display technology as integral elements in the systems engineering design process to ensure the user's perspective is related in the HMI design.

**3.5.1.3 System Safety.** The Contractor shall establish, implement, and maintain a System Safety Program (SSP) in accordance with MIL-STD-882C (Task 101), using STANAG 4404 as guidance. The Government will provide an AIEWS System Safety Program Plan (SSPP) information as GFI. The Contractor shall update and maintain this plan as part of the system safety deliverable. In addition to Section 4 of MIL-STD-882C the following subparagraphs shall be elements in the design and incorporated as part of the safety program. All hazards shall be logged, identified, and reported as described in the SSPP.

**3.5.1.3.1 Safety Hazard Elimination/Mitigation.** The Contractor shall implement all design requirements identified in the SSPP, and in STANAG 4404 where applicable. Safety hazards shall be eliminated through design where applicable. Those hazards that cannot be eliminated shall be mitigated to an acceptable hazard category as defined in the SSPP.

**3.5.1.3.2 Safety Tasks.** The Contractor shall develop the documentation below in accordance with MIL-STD-882C and as described in the SSPP. The Contractor shall recommend corrective actions for all safety issues. The Government shall have final determination of the hazard classification and the risk acceptance level.

- Preliminary Hazard List (PHL) using MIL-STD-882C (Task 201).
- Preliminary Hazard Analysis (PHA) using MIL-STD-882C (Task 202).
- System and Software Hazard Analyses (SHA and SWHA) categorized by hazard severity and probability as defined in the SSPP, and in accordance with MIL-STD-882C (Task 203).
- Subsystem Hazard Analysis (SSHA) using MIL-STD-882C (Task 204).
- Operating and Support Hazard Analysis (O&SHA) categorized by the Risk Hazard Assessment Matrices in the SSPP, and in accordance with MIL-STD-882C (Task 206).
- Safety Assessment Reports (SARs) using MIL-STD-882C (Task 301).
- Safety Test Plan (STP) using MIL-STD-882C (Task 302).
- Fault Tree Analysis (FTA) using MIL-STD-882C (Task 401).

**3.5.1.3.3 Safety Support.** The Contractor shall support the safety effort in accordance with MIL-STD-882C (Task 105), as required. This support shall include, but not limited to, attending and participating in Failure Boards, CCB meetings, WSESRB meetings, SSS

TRP meetings, Program Review meetings, and appropriate IPT meetings. The Contractor shall assign a system safety representative to be the safety point-of-contact for the company. The Contractor shall generate and log Hazard Action Reports (HARs) for any observed or detected actual or potential hazard. HAR format shall be as identified in the SSPP, and documented as part of the system safety deliverable.

**3.5.1.3.3.1 WSESRB Support.** The Contractor shall supply additional information when required for the data packages presented to the WSESRB. The Contractor shall attend WSESRB meetings, as required, and provide technical expertise to assist in answering questions or providing appropriate presentations.

**3.5.1.4 Configuration Management (CM).** The Contractor shall plan, implement, and maintain in the specialty engineering document a CM program that includes configuration identification, control, status accounting, and audits for AIEWS. The Contractor shall structure its CM program and CM Plan (CMP) to be compliant with requirements of 9470-002-A-X-C, "PEO(TAD)-D Configuration Management Plan for Ship Self Defense Programs"; however, in the case of conflict between this SOW and the PEO(TAD) CMP, the SOW shall take precedence.

**3.5.1.4.1 Configuration Identification.** The Contractor shall establish three formal configuration baselines; functional, allocated, and product. During the development of each baseline, the Contractor shall place the data under internal configuration control and shall maintain configuration status accounting information for each Configuration Item (CI). The functional baseline shall be established following the SDR and the allocated baseline shall be established following CDR. A PCA shall be conducted on an LRIP model to establish the Production Baseline following the completion of testing, and the incorporation and validation of engineering changes required as a result of testing. The Government shall be given access to configuration status accounting information as required. When each CI is approved, it shall transition to Government configuration control and may be changed only as the result of a Government-approved Engineering Change Proposal (ECP), or temporarily via a Request for Deviation (RFD) or Request for Waiver (RFW). Reference designations shall be assigned using IEEE-STD-200 as guidance, and JETDS nomenclatures. The Contractor may use MIL-STD-196D as guidance at the subsystem level.

**3.5.1.4.2 Configuration Control.** Advance Change/Study Notices (ACSNs) Critical/Major RFD/Ws and ECPs with associated Specification Change Notices (SCNs) and Notice of Revisions (NORs) shall be prepared and submitted as required using the modified forms provided in the GFI LAN Integrated Network Kernel (LINK) system. NORs and SCNs will not be approved unless attached to an ECP.

**3.5.1.4.2.1 Class I Engineering Change Proposals (ECPs).** Changes to a baseline which meet the criteria for a Class I or Critical/Major RFD/W of 9470-002-A-X-C, shall not be

implemented unless and until approved in writing by the Government or IPT with an approved charter and empowered to approve Class I ECPs. Pending such approval, the Contractor shall proceed with contract performance without regard to the effect of any such Class I or major proposed engineering change. Class I ECPs shall be preceded by an ACSN, except under certain conditions delineated in 9470-002-A-X-C. The compatibility justification will not constitute authorization to incorporate the proposed change without Government or IPT approval. Recurring RFDs and RFWs are discouraged.

**3.5.1.4.2.2 Class II ECPs and Minor RFD/Ws.** Class II ECPs or minor RFD/Ws initiated by the Contractor shall not be implemented unless and until approved by the Government or IPT with an approved charter and empowered to approve Class II ECPs. In the event of disapproval, the Contractor may request a Government review within five working days of the notification. Class II ECPs shall not impact hardware or software directly; Class II changes shall be for correction to TDPs only, required to overcome ambiguity or correct erroneous parts lists.

**3.5.1.4.2.3 Configuration Audits.** Configuration audits shall be performed in accordance with 9470-002-A-X-C to establish the functional, allocated, and product baselines. The Contractor shall support the Government in conducting a review of the Functional Configuration Documentation (FCD) immediately following the SDR, a review of the Allocated Configuration Documentation (ACD) immediately following the PDR, and review of the PCD immediately following the CDR. The PCA shall be conducted on one of the first two LRIPs delivered by the Contractor. The Contractor shall provide the system (if applicable), facilities, and all related documentation, including PCA planning documentation, to conduct the audit. A moratorium on changes shall be imposed during the period of the audit. All changes in the process of being incorporated shall be presented to the audit team as the list of outstanding changes. The Contractor shall also record the minutes and provide a summary report for all audits. The report shall document the audit findings and planned corrective actions and their completion dates.

**3.5.1.4.2.4 Configuration Status Accounting (CSA).** The Contractor shall establish a CSA system in accordance with 9470-002-A-X-C that will identify baseline configurations and the approved and proposed changes thereto. The CSA data shall be part of the specialty engineering document and shall provide the status of proposed changes and of implementation of approved changes into the hardware, software, and documentation, as appropriate.

**3.5.1.5 Quality Assurance (QA).** The Contractor shall establish, implement, maintain and document in the specialty engineering document a value-added Quality Assurance System (QAS) that is integral to the overall development process. This system shall be comprised of management, technical resources, plans, procedures, schedules, and

controls necessary to ensure conformance to contractual requirements. The QAS shall address the requirements of ANSI/ASQC Q9001, or an equivalent model, and the software quality provisions of IEEE J-STD-016. The QAS will address system requirements, reviews, corrective and preventive procedures, quality audits, cost tracking, supplier quality, inspections, inspection and test reports, special equipment and calibration of, tests, software and hardware development, design control, document and data control, final inspections, control of non-conforming products, quality records, Government Furnished Property (GFP) and Bailment Agreements, control of mercury contamination, Electrostatic Discharge (ESD), and limited life item controls.

**3.5.1.6 Pre-Production Engineering.** The Contractor shall document as part of the specialty engineering document all production-related efforts as the development effort evolves to ensure a successful transition from development to production of AIEWS.

**3.5.1.6.1 Manufacturing Planning.** The Contractor shall complete the manufacturing planning, processes, and practices required to fabricate, build, and test the system in a production environment. Manufacturing engineering transition planning shall describe the Contractor's readiness for production. Manufacturing planning data shall use NAVSOP-6071 as a guide including the use of checklists and alarms as a means to assure that applicable issues are addressed prior to proceeding into production. This planning shall address manufacturing methods and procedures aimed at improving reliability, quality, and reducing cost. The planning effort shall result in a schedule that identifies all major subassemblies, tooling, test equipment, facilities, critical and strategic materials, and ESS.

**3.5.1.6.2 Producibility Analysis.** The Contractor shall perform a producibility analysis as part of the system engineering effort to address issues affected by each design iteration. The Contractor shall identify and take the necessary steps to reduce high risk production areas as early as possible in the program. The results of the producibility analysis shall be presented at technical reviews and documented as part of the specialty engineering document.

**3.5.1.7 Natural and Induced Environmental Compatibility (N&IEC).** The Contractor shall establish and implement environmental compatibility management planning integral to the SpEMP to assure that equipment will be designed and tested for all pertinent environmental conditions to which it will be subjected during its life-cycle. The SpEMP shall describe how N&IEC requirements described in the AIEWS P&CR shall be implemented. The SpEMP shall indicate the allocation of N&IEC design requirements to the subsystem or equipment level to include subcontractor and Government-furnished equipment. This planning shall ensure timely identification and correction of N&IEC problems. The Contractor shall be responsible for maintaining N&IEC compliance throughout the duration of this contract.

**3.5.1.8 Electromagnetic Environmental Effects (E<sup>3</sup>) Control.** The Contractor shall establish, maintain, and document as part of the specialty engineering document an E<sup>3</sup> program to ensure that AIEWS is self-compatible and will operate in its shipboard and tactical E<sup>3</sup> environment without causing or suffering unacceptable mission performance degradation. The Contractor shall perform any E<sup>3</sup> tasks necessary to ensure the overall system performance requirements specified in the P&CR are met. E<sup>3</sup> includes Electromagnetic Compatibility (EMC), Electromagnetic Interference (EMI), Electromagnetic Susceptibility (EMS), Electromagnetic Vulnerability (EMV), Electrostatic Discharge (ESD), Electromagnetic Pulse (EMP), Radiation Hazards (RADHAZ), magnetic fields, and lightning.

**3.5.1.9 Frequency Management.** The Contractor shall prepare and update frequency certification data for all systems and subsystems designed to either emit or receive electromagnetic energy. The data shall be made available as part of the specialty engineering document may use DD Form 1494 as guidance.

**3.5.1.10 Continuous Environmental Assessment.** The Contractor shall perform and document in the specialty engineering document a continuing assessment of AIEWS to determine the potential effects on land, sea, and air environments, and potential impacts to public health and safety by the development, test, manufacture, operation, support, and disposal of AIEWS. Methods to avoid or minimize environmental harm shall be identified and assessed. Cost effective mitigation measures shall be developed and implemented when necessary. Information regarding environmental analysis shall be presented during technical reviews.

**3.6 SYSTEM/SUBSYSTEM INTEGRATION.** The Contractor shall be responsible for meeting external Combat System integration requirements and for the integration of all AIEWS subsystems/components. The internal interfaces of AIEWS includes those interfaces between the ES, EA, and C&P subsystems. The external interfaces of AIEWS include all existing shipboard systems as identified in the P&CR. As part of the system/subsystem integration effort, the Contractor shall design AIEWS interfaces to minimize software and hardware integration modifications/changes required to integrate with various Combat Systems and ship classes which AIEWS will be installed. The Contractor shall perform any system and subsystem integration tasks needed to execute the requirements of this contract, and as described in the following.

The Contractor shall document integration/interface-related efforts as the development effort evolves. The system/subsystem integration deliverable document shall integrate planning, requirements/specification, design, and testing data/information. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes; it is a “living document” meant to facilitate value-added data/information needed to document the design evolution. The system/subsystem integration

document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key integration efforts. The final integrated system/subsystem integration document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option exercise.

**3.6.1 System/Subsystem Integration Plan (S<sup>2</sup>IP).** The Contractor shall develop a plan to incorporate AIEWS subsystems, including future Options. This plan shall also address the Contractor's approach for integration and testing. Any unique hardware or software required for external system integration shall be considered part of the AIEWS configuration.

**3.6.2 Hardware/Software Interfaces.** The Contractor shall analyze all system functional interfaces to define the system and subsystem level interface requirements and ensure compatibility before design implementation. All interfaces shall be defined and specified in the system/subsystem integration deliverable prior to integration testing. The Contractor shall conduct specific tests to verify that interface requirements are being/have been met. The interface analysis and definition effort shall be conducted throughout the program and reviewed during each technical review.

**3.6.3 Hardware/Software Interface Control.** The Contractor shall be responsible for the AIEWS element of Combat System interface control as well as for the internal AIEWS interfaces. The Contractor shall be responsible for the execution of the system and subsystem integration efforts for the electrical, software, and mechanical interfacing internal to the AIEWS system; schedule meetings to exchange information regarding interfaces; and act as a central point for resolving technical interface problems. When approved, interface control drawings and documentation shall be provided as part of the system/subsystem integration deliverable.

**3.6.3.1 Installation Control Drawings (ICDs).** The Contractor shall include, as part of the ICDs, signal interface data and cabling/connector requirements for item-to-item and item-to-ship interfaces. The documentation to be provided by the Contractor shall include plans, procedures, and drawings for installing AIEWS. The Contractor shall develop separate ICDs for each Increment of AIEWS.

**3.6.4 External Interface Requirements and Design.** The interface requirements will be identified, documented, and controlled in the external Interface Requirement Specifications (IRSs) which will be supplied in draft form by the Government as GFI. The Contractor, in conjunction with the Government, via the IPT process, shall further define the external IRSs and develop AIEWS physical interfaces to the ship, and physical and functional interfaces to the systems specified in the P&CR. The Contractor shall also develop an Interface Design Description (IDD) for each external interface which shall be part of the system/subsystem integration deliverable.



**3.6.5 Correction of Interface Problems.** The Contractor shall be responsible for the analysis and correction of all AIEWS system interface incompatibilities that are discovered during factory integration testing, land-based testing, and shipboard testing. All such problems shall be corrected prior to Operational Testing.

**3.7 TEST AND EVALUATION (T&E).** The Contractor shall plan, establish, and execute a Test and Evaluation (T&E) program. The Contractor's T&E program shall identify testing required and the test criteria needed to fully demonstrate that AIEWS meets all the requirements specified in the P&CR, as well as the SSS-level design. The Government shall document the results of all testing and establish corrective actions for items which do not meet design thresholds.

The Contractor shall document all test-related efforts as the development effort evolves. The T&E deliverable document shall integrate planning, testing, and reports. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes; it is a “living document” meant to facilitate value-added data/information needed to document the testing conducted to verify compliance with the requirements and specification documentation. The T&E document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key integration efforts. The final integrated T&E document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option exercise.

**3.7.1 Master Test Plan (MTP).** The Contractor shall develop a MTP describing how the T&E program will demonstrate system performance. The Contractor shall describe test program evolution from low-level, component tests through complete system and external interface tests. The Contractor’s MTP shall cover factory qualification testing/First Article Testing (FAT) through final acceptance/contract completion. Contractor shall provide a traceability matrix correlating tests to system requirements, if needed. The Contractor shall include schedule considerations for system as the design effort evolves; test procedure development; review and approval; potential re-tests; regressive testing; test data collection, reduction and distribution; test reporting; and other interrelated tasks to ensure the availability of a fully qualified system within the program schedule. The Contractor shall witness and participate in factory qualification and acceptance testing of incremental builds of the CAP GFP. As part of the MTP, the Contractor shall document specialty test plans to cover as a minimum but not be limited to, the following specialties: safety, R&M, E<sup>3</sup> and HMI. The Contractor plan shall support the Government with the necessary information and equipment to assume T&E responsibilities. Contractor resources and plans/procedures shall be made available to the Government for IV&V.

**3.7.2 Government Witness of Tests.** The Government shall be given the opportunity

to witness all major tests conducted by the Contractor. The Contractor shall provide the Government written notice at least 2 weeks before the beginning of each major test.

**3.7.3 Test Procedures.** For each test described in the MTP, the Contractor shall prepare and document as part of the T&E deliverable test procedures and a traceability matrix correlating tests to system/subsystem requirements prior to conducting the test.

**3.7.4 Factory Qualification Testing.** The Contractor shall perform final system acceptance testing before Government acceptance and shipment to the land-based test site mentioned in 3.7.5.

**3.7.5 Land Based Testing.** The Government anticipates conducting separate land-based developmental tests for each combat system with which AIEWS will integrate. For planning purposes, the Contractor shall assume that land-based testing will occur at Wallops Island, Virginia, to support integration and testing of two separate combat systems. The Contractor shall assume that Increment 1 land-based testing will last six months and Increment 2 land-based testing will last three months.

**3.7.6 Shipboard Testing.** The Government anticipates conducting separate shipboard developmental and operational tests for each combat system with which AIEWS will integrate. The Contractor shall support the Government's plan, and coordinate the installation of the system on the test ships. The Contractor shall supply technical personnel to assist with installing and checking-out the system. The Contractor shall assume that Increment 1 shipboard testing will last six months and Increment 2 shipboard testing will last three months. After the installation effort is complete, the Contractor shall verify that the system meets the specified performance thresholds tested/verified during Formal Qualification Test (FQT).

**3.7.7 Test Report Summaries.** For each test described in the MTP, the Contractor shall summarize the conduct of each test and document test results, analyses, and following action recommendations. The Contractor shall identify and report in the IMR key test events, results or problems, and make test report summaries available to the Government within 30 days after each test. The Contractor shall clearly indicate the level of performance achieved by the system relative to the requirements and corrective actions recommended, if any.

**3.7.8 System Acceptance.** The Contractor shall correct any system design and performance deficiencies disclosed from contract award through OT. Formal verification of required corrections will be performed before final acceptance of the system at any level. Each EDM shall be production-representative such that it could be efficiently back-fitted to serve as a shipboard system. The Government anticipates that system acceptance will occur in stages with the final acceptance following verification of required system corrections. Interim stages of system design acceptance are anticipated

to be as follows:

- Early demonstration of critical technical performance issues. The Contractor shall plan and conduct an early demonstration of developed EDM elements and/or NDI components of the receiver/antenna system to demonstrate precision ESM and SEI capability, and to provide insights into solutions for multipath errors, emitter classification requirements, and false detections. This demonstration effort will also require an early start of combat system integration efforts to allow for reduced manning and control architecture for forward-fit integration of AIEWS with the combat system. Successful completion of this demonstration effort will be considered the first step leading to final acceptance of the EDMs for Increment 1.
- Successful environmental and other specialty engineering testing.
- Successful incremental land-based EDM system testing, including Combat System Integration.
- Successful completion of DT/OT.
- For Increment 2, interim system acceptance is anticipated in stages similar to that mentioned above.

LRIP and Production Acceptance will be defined with exercise of those options.

**3.8 INTEGRATED LOGISTICS SUPPORT (ILS)** . The Contractor shall perform ILS tasks needed to ensure compliance of the system with the requirements in the P&CR, and as described in the following.

The Contractor shall document logistics-related efforts as the program evolves. The ILS deliverable document shall integrate planning, requirements, and data/information necessary for support of the system. This integrated deliverable document is not intended to be a consolidation of traditional CDRL items and Data Item Descriptions (DIDs) with associated submissions and review processes; it is a “living document” meant to facilitate value-added data/information needed to document the design evolution. The ILS document shall be developed as part of the IPT process with the document made available for Government review as it is baselined for each evolving completion of key logistics efforts. The final ILS document shall be delivered to the Government at the completion of the E&MD phase or, if requested, prior to Option execution.

**3.8.1 Integrated Support Plan (ISP)**. The Contractor shall produce an ISP for implementation of the logistics support requirements of this contract. In addition, the ISP shall contain a detailed outline of the Logistics Management Information (LMI) planned during this contract. The ISP shall identify GFE requirements, notification and approval of proposed GFE modifications, and GFE maintenance procedures.

**3.8.2 Logistics Management Information (LMI)** The Contractor shall identify and document as part of the logistics support document complete support requirements for

each LMI candidate identified by the Contractor, using Performance Specification MIL-PRF-49506, or the Contractor may suggest alternative means of satisfying these requirements to make information more readily available and to utilize more efficient business practices. The LMI program shall be the single analytical logistical effort and shall constitute a composite of LMI summaries performed by various systems engineering disciplines. The LMI shall verify the system supportability requirements.

**3.8.3 Reliability Centered Maintenance (RCM).** The Contractor shall determine and document in the logistics support document preventive maintenance requirements based on the principles of RCM in conjunction with the LMI process. The Contractor will use RCM Handbook S9081-AB-GIB-010/MAINT as guidance in performing RCM tasks.

**3.8.4 Level of Repair Analysis (LORA).** The Contractor shall conduct and document as part of the logistics support document a LORA to establish feasible least cost repair or discard decision alternatives for maintenance. The LORA for AIEWS shall consider all three maintenance levels (organizational, intermediate, and depot) and miniature/micro-miniature (2M) module testing and repair capabilities in the development of a repair or discard analysis.

**3.8.5 Maintenance Planning.** The Contractor shall develop and document maintenance planning as part of the ISP which shall result in the identification of all maintenance efforts planned to support conformance with P&CR requirements and to support analysis of personnel and maintenance resource requirements. The Contractor shall include the use of integrated diagnostics in planned and corrective maintenance requirements.

**3.8.5.1 Maintenance Concept.** Maintenance of AIEWS shall be considered at the organizational, intermediate, and depot levels. At the organizational level, maintenance will consist of fault isolation and removal and replacement of the Lowest Replaceable Units (LRUs). An AIEWS 2M repair concept shall be developed by the Contractor for organizational and intermediate levels, for each LRU that is testable by the Navy's AN/USM-646(V). The Contractor's maintenance concept should address the use of Gold Disk development using DOD ST821-AG-PRO-010 AN/USM-646(V) Gold Disk Development Procedures. Other repairs of LRUs will be accomplished at the depot level. Maintenance Assistance Modules (MAMs) shall not be utilized by the Contractor. It is the Government's objective to minimize the requirement for General Purpose Electronic Test Equipment (GPETE), Special Purpose Electronic Test Equipment (SPETE), ATE, and support equipment specifically required to support AIEWS maintenance. The Contractor shall identify all GPETE, SPETE, and ATE recommended; however, the Government must provide approval for the use of this equipment. Navy inventory test equipment shall be used to the maximum extent practicable. The Contractor shall also assess the use of Battle Group Intermediate

Maintenance Activity (BGIMA), shore IMAs, and the use of the Consolidated Automated Support System (CASS) on AIEWS, and provide recommendations for design and partitioning in support of using BGIMA, IMAs, and CASS.

**3.8.5.2 Planned Maintenance.** The Contractor shall develop and document as part of the logistics support document a Planned Maintenance System (PMS) that will identify the material and procedures needed to perform organizational and intermediate level maintenance using MIL-P-24534A as guidance. This shall include the Contractor's plan for using the IETM in supporting planned maintenance, developed scheduled Maintenance Requirement Cards (MRCs), unscheduled MRCs and Maintenance Index Pages (MIPs). The PMS shall be based on the results of the RCM analysis performed by the Contractor.

**3.8.5.3 Integrated Diagnostics.** The Contractor shall develop integrated diagnostics that perform as a set of comprehensive tools in maintenance and troubleshooting of AIEWS. Integrated diagnostics shall be capable of fault isolation to the LRU with minimal operator or technician input. Integrated diagnostics shall provide links to the Interactive Electronic Technical Manual (IETM), PMS, GPETE, failure and maintenance databases, Automatic Test Equipment (ATE) (if needed), and the Shipboard Supply Support System. If separate ATE is required for PMS checks, system alignments, or other maintenance actions, ATE setup shall be incorporated in the IETM.

**3.8.6 Supply Support.** The Contractor shall retain sufficient spares to support program developmental and acceptance testing requirements, including Government DT/OT. The Contractor shall develop a Supply Support Management Plan as part of the logistics support document that addresses, but is not limited to Direct Vendor Delivery (DVD) Support as described in Options XI and XII. The Contractor shall also develop the Provisioning Technical Document (PTD) as part of the LMI using MIL-PRF-49506 as guidance or contractor equivalent.

**3.8.6.1 Provisioning and Provisioning Conferences.** The Contractor shall develop the PTD using the for Logistics Management Information MIL-PRF-49506 Provisioning List Data Requirements as guidance or contractor equivalent. The Contractor shall host and participate in Government provisioning conferences and In-Process Reviews (IPRs) as required.

**3.8.6.2 Provisioning Lists.** The Contractor shall recommend, for Government approval, information for provisioning lists necessary to support the system throughout its life-cycle. This information shall be provided as part of the logistics support document using the LMI data products worksheet in MIL-PRF-49506 (Appendix B) as guidance or contractor equivalent.

**3.8.6.3 Supplementary PTDs (SPTDs).** The Contractor shall determine and document

as part of the logistics support data all supplementary technical documentation required to support initial provisioning. SPTD shall be prepared using MIL-PRF-49506 as guidance, and shall be delivered concurrently with provisioning parts list data for support and verification.

**3.8.6.4 Installation and Checkout (INCO) Kits.** The Contractor shall develop, procure, assemble, and deliver two INCO kits for the EDMs to be used on the test ships. The Contractor shall determine all items (hardware, software, tools, test equipment, fixtures, jigs, spares, etc.) required to support installation, system checkout, and acceptance testing at the time of initial equipment installation. INCO items provided by the Contractor shall be used to replace parts failed because of testing, installation, and AIEWS item maintenance prescribed by the installation procedures.

**3.9 TRAINING AND TRAINING SUPPORT.** The Government will provide Manpower, Personnel & Training (MPT) information to support the development of the system, training requirements, and IETM development. This information shall include: 1) Preliminary Task Analysis which will contain an AIEWS watchstation job task inventory delineating mission essential skills; 2) Combat systems task matrix; 3) MPT recommendations affecting AIEWS design; 4) Recommended allocation of tasks within AWS and ISD; 5) Analysis of Variation (ANOVA) relative to other combat systems masters skills; 6) MPT Analysis. This information will be provided incrementally as GFI to support the proposed system design, training, maintenance, and IETM concepts. The Contractor shall analyze, design, develop, and document as part of the Training Data deliverable an integrated training methodology which supports the positive transfer of required knowledge and skills from formal schoolhouse to afloat training. The Contractor shall analyze, design and develop curriculum materials as part of the Training Data, and provide personnel to conduct an initial AIEWS operations and maintenance course of instruction for the initial training of AIEWS instructors, DT/OT crew and engineering personnel. The curriculum materials shall be developed to achieve the operation and maintenance requirements defined in the AIEWS P&CR. The Contractor shall perform training material development which maximizes reusability between shipboard and classroom training materials. The AIEWS training software shall be in the form of an automated learning environment that encompasses the minimum capabilities of a "Class 4" Interactive Electronic Technical Manual (IETM) and an instructor multimedia editing and delivery system for use afloat and with extensibility for use ashore. The Contractor shall analyze and document as part of the Training Data options/tradeoffs including cost/benefit of Class 5 vs. Class 4 IETM. The user/instructor training presentation tools shall provide the users/instructors with the creation, presentation, and modification of learning materials in an electronic format maintaining compatibility with, and using the Training Integration Management System (TIMS) format as a guide. The course materials and course curriculum will be developed using MIL-STD-1379D, MIL-STD-1840B, MIL-PRF-2800A, MIL-PRF-28001B, MIL-PRF-28002, MIL-PRF-28003, MIL-M-87268 and MIL-D-87269 as guidance for

consistency with other combat system elements, and to be compatible with the Authoring Instructional Materials System. The Contractor shall host a Training Program Guidance Conference to identify and schedule the expected training developmental milestones. The Contractor shall present personnel performance profiles; equipment, system, and subsystem tables; and course learning objectives. The Contractor shall analyze, design, develop, and document as part of training software elements embedded training to support operator mission critical skill development and maintenance in a stand-alone mode, CS team training through the integration of AIEWS operator skill training with coordinated CS team training, multi-warfare and Battle Force team training through the coordination of AIEWS operator skill training with BFTT scenarios and embedded maintenance training, which includes the use of the IETM to support the system's maintainability requirements. Embedded training shall provide basic, intermediate, and advanced operator skill training in a tactical environment, and build-on and advances the level of training obtained in fundamental schoolhouse instruction. The primary focus of embedded operator skill training shall be on optimizing accurately evaluated and properly correlated AIEWS information, and rapidly integrating EW information into the common CS tactical picture. The Contractor shall analyze, design, develop, and document as part of the Training Data a human performance task model and methodology for operational skill performance monitoring, assessment and feedback of mission essential skills. Skill performance monitoring, assessment, and feedback shall provide time and accuracy measurements of mission critical skills compared to programmable operational standards to evaluate successful task performance. Skill performance measured before and after training sessions shall be used to assess training effectiveness. Performance monitoring and assessment features shall include user feedback and links to the applicable learning material for skill reinforcement.

**3.9.1 Training Services.** The Contractor shall provide instructional and instructor advisory services:

- Operational subject matter expert services in support of the Government's training development program.
- Training course instructional and instructor advisory services using MIL-STD-1379D, Tasks 401 and 402, as guidance.
- As part of initial training, the Contractor shall provide instruction on the optimization of the system to meet operational requirements. Organic training includes all embedded capabilities provided to improve system operator proficiency, maintenance, and combat system team training. As part of organic training, the Contractor shall include Battle Force Tactical Training (BFTT) as a subset of ownship combat system training, skill performance monitoring and assessment capabilities and interpretation, instruction on the capabilities and use of the IETM, and BIT capabilities and interpretation. The principles provided in MIL-M-87268 and MIL-D-87269 shall be used as guidance for consistency with other

combat system elements in IETM design and development. Organic Training shall be addressed and documented in the training materials and technical manuals.

**3.10 INCREMENT 1 LRIP OPTION (Option I).** The Contractor shall manage, produce, test, package, and deliver AIEWS Increment 1 Low-Rate Initial Production (LRIP) systems, related equipment (including support equipment), spares, and related documentation in accordance with the requirements outlined in the Increment 1 section of this SOW, unless otherwise specified. The Contractor shall conduct First Article Contractor Testing prior to delivery of the Increment 1 LRIP systems in accordance with the approved MTP. The Government reserves the right to monitor all aspects of FAT. FAT will be considered complete upon Government approval of the FAT report. The data, plans, procedures, controls, and processes developed/established during the E&MD portion of this contract shall remain in effect during this option and must be updated as applicable for Increment 1 LRIP. Additional tasks and documentation requirements to support LRIP and production must be identified by the Contractor. End item and major component factory final acceptance procedures shall be available to the Government upon request.

**3.10.1 Production Management.** The Contractor shall appoint a production manager for the manufacture, fabrication, test, and support of the Increment 1 LRIP subsystems according to the approved management, transition, and manufacturing plans.

**3.10.2 Production Engineering.** The Contractor shall update the product baseline using the ECPs and ECNs generated during the Increment 1 development and testing; update the system design and production-level documentation, training materials, and support documentation, as specified in this SOW; update all system performance data, logistics data, provisioning and training data ; update the existing EDMs to LRIP configurations; support any technical reviews, audits, tests, trade studies required during the LRIP effort; and provide general engineering support, as outlined in the Increment 1 E&MD section of this SOW.

**3.10.3 Production Readiness Review (PRR).** The Contractor shall coordinate with the Government to schedule and conduct a PRR for Increment 1. As part of this coordination effort, the Contractor shall submit a draft PRR agenda to the Government for approval. At a minimum, the PRR shall address: 1) Readiness and stabilization of the production design; 2) Adequacy of plant and personnel resources; 3) Production engineering and planning; 4) Availability of materials and purchased parts; 5) Implementation of TQM; 6) Production system logistics; 7) Maturity and stability of software and documentation; and 8) Implementation of safety plans.

**3.10.4 Installation and Check Out (INCO).** The Contractor shall develop, procure, assemble, and deliver INCO kits. The number of kits required is equal to the number of installation sites plus the number of simultaneous installations at each site. The



Contractor shall develop, procure, assemble, and deliver Replenishment INCO kits equal to the number systems procured minus the number of INCO kits procured.

**3.11 INCREMENT 2 E&MD OPTIONS (Options II & III).** The Increment 2 E&MD is comprised of two separate options. *Option II* is the development of an onboard RF countermeasures capability. *Option III* is the development of an onboard IR countermeasures capability. The Government is not obligated to exercise any of these options, and if any are exercised, they may or may not be exercised in numerical order. The EA-RF and EA-IR options cover the acquisition of the AIEWS onboard RF and IR subsystems, related equipment (including support equipment), spares, and associated documentation. The Contractor shall adhere to the requirements as outlined in the Increment 1 E&MD section of this SOW, unless otherwise specified.

**3.11.1 Technical Documentation.** The approved/baselined Increment 1 design and technical documentation shall form the basis for EA Increment 2 documentation. The Contractor shall modify or append existing Increment 1 documentation to reflect the Increment 2 E&MD.

**3.11.2 Increment 1 System Resources.** The Government intends to deliver up to 2 Increment 1 LRIP systems in-place to the Contractor to support development and integration of the EA subsystem(s). The Contractor shall define additional hardware resource requirements needed to develop the EA subsystem(s). Conservation of resources within schedule considerations shall be applied to share resources and control costs.

**3.11.3 Development Engineering.** For the selected option, the Contractor shall execute the provisions of this SOW described in the development of Increment 1. The products of Increment 1 will be used as a baseline.

**3.12 INCREMENT 2 LRIP OPTIONS (Options IV & V).** The Increment 2 LRIP option is comprised of three separate options. *Option IV* is the limited production of onboard EA-RF only subsystems. *Option V* is the limited production of onboard EA-IR only subsystems. The Government is not obligated to exercise these options, and if either is exercised, they may or may not be exercised in numerical order. The EA-RF and EA-IR LRIP options cover the acquisition of the AIEWS onboard RF and IR subsystems, related equipment (including support equipment), spares, and associated documentation. The Contractor shall adhere to the requirements outlined for the Increment 1 LRIP section of this SOW, unless otherwise specified. The Contractor shall manage, produce, test, package, and deliver AIEWS Low-Rate Initial Production (LRIP) systems, related equipment (including support equipment), spares, and related documentation in accordance with the requirements outlined in the Increment 1 section of this SOW, unless otherwise specified. The data, plans, procedures, controls, and processes developed/established during the E&MD portion of this contract shall

remain in effect during this option and updated as appropriate. Approval to purchase long-lead material will be granted approximately one year prior to exercising any of these options.

**3.12.1 Production Management.** The Contractor shall appoint a production manager for the manufacture, fabrication, test, and support of the Increment 2 LRIP subsystems according to the approved management, transition, and manufacturing plans.

**3.12.2 Production Engineering.** The Contractor shall update the product baseline using the ECPs and ECNs generated during the Increment 1 (and Increment 2, as appropriate) development and testing; update the system design and generate production level documentation, training materials, and support documentation, as specified in the SOW; update all system performance data, logistics data, provisioning data, and training data; update the existing EDMs to LRIP configurations; support any technical reviews, audits, tests, trade studies required during the LRIP effort; and provide general engineering support, as specified in the SOW for Increment 1.

**3.12.3 Production Readiness Review (PRR).** The Contractor shall coordinate with the Government to schedule and conduct a PRR for Increment 2. As part of this coordination effort, the Contractor shall submit a draft PRR agenda to the Government for approval. At a minimum, the PRR shall address: 1) Readiness and stabilization of the production design; 2) Adequacy of plant and personnel resources; 3) Production engineering and planning; 4) Availability of materials and purchased parts; 5) Implementation of statistical process control; 6) Production system logistics; 7) Maturity and stability of software and documentation; and 8) Implementation of safety plans.

**3.12.4 Replenishment INCO.** The Contractor shall develop, procure, assemble and deliver Replenishment INCO kits equal to the number of systems procured.

**3.13 INCREMENT 1 PRODUCTION OPTIONS (Options VI, VII & VIII).** The Increment 1 production option consists of *Options VI, VII, and VIII*. The Government is not obligated to exercise any of these options, and if any are exercised, they may or may not be exercised in numerical order. The production rates and schedule will be defined by the Government at time of exercising the options. The Increment 1 production options also covers the acquisition of related equipment (including support equipment), spares, and associated documentation. The Contractor shall adhere to the requirements as outlined in the Increment 1 E&MD and LRIP sections of this SOW, unless otherwise specified.

**3.13.1 Production Readiness Review (PRR).** The Contractor shall coordinate with the Government to schedule and conduct a PRR for Increment 1. As part of this coordination effort, the Contractor shall submit a draft PRR agenda to the Government for approval. At a minimum, the PRR shall address: 1) Readiness and stabilization of

the production design; 2) Adequacy of plant and personnel resources; 3) Production engineering and planning; 4) Availability of materials and purchased parts; 5) Implementation of TQM; 6) Production system logistics; 7) Maturity and stability of software and documentation; and 8) Implementation of safety plans.

**3.13.2 Contractor Repair Depot (CRD) Operation.** The Contractor shall estimate and present at the PRR requirements to establish a CRD to inspect, disassemble, clean, repair, overhaul, modify, assemble, test, mark, preserve, and package NRFI material received from Government activities. The Government will determine at a later date whether the Development Contractor will be required to establish a CRD

**3.13.3 Replenishment INCO.** The Contractor shall develop, procure, assemble and deliver Replenishment INCO kits equal to the number of systems procured.

**3.14 SOFTWARE SUPPORT ACTIVITY (SSA) OPTION (Option IX).** The formal SSA function will begin upon final acceptance of AIEWS Increment 1 EDMs. The Contractor shall perform SSA functions required to maintain, enhance and/or update all AIEWS software as described in the approved AIEWS SSA Plan (SSAP). The Government estimates that this effort will continue for approximately ten years after exercising this option. At a minimum, SSA duties shall include: 1) Updating and maintaining the SSA software development plan; 2) Developing and maintaining a computer program generation facility to include all support software and equipment; 3) Maintaining AIEWS WASP; 4) Processing all software trouble reports; 5) Conducting a local change control board; 6) Maintaining configuration control of all software baselines; 7) Performing software QA and other CM functions; 8) Developing and testing new computer program releases; 9) Delivering Version Descriptions Documents with program releases/deliveries; and 10) Identifying and collecting software metrics for all computer programs. For pricing purposes, the Contractor shall assume a 5% change in AIEWS software per year for ten years.

**3.15 ENGINEERING SERVICES FOR TRAINING AND INSTALLATION OPTION (Option X).** The Contractor shall provide field engineers/technical representatives to support E&MD, testing, training, and LRIP. These services will be required to support LRIP installations ashore and aboard ship. Contractor personnel shall: 1) Assist in installation and checkout; 2) Provide training to shipyard and depot personnel during installations; 3) Support system "grooming" prior to DT/OT events; and 4) Assist in system troubleshooting and repair on an on-call basis. The Contractor shall make personnel available to support engineering proofs of documentation, maintenance procedures, and ORDALT and ECP kit proofing.

**3.16 DIRECT VENDOR DELIVERY (DVD) SUPPLY SERVICES OPTIONS (Option XI & XII).** *Option XI* is limited to support of Increment 1 subsystems. *Option XII* is limited to support of Increment 2 subsystems. The Government is not obligated to

exercise these options, and if either is exercised, they may not be in numerical order. The Contractor shall implement a Direct Vendor Delivery (DVD) program that will maintain or function as the Government's Commercial Stock Point (CSP) for material applicable to the AIEWS program not currently supported by the Navy supply system. The CSP performs all routine inventory management functions for Ready For Issue (RFI) and Not Ready For Issue (NRFI) components including receiving, shipping, tracking, warehousing, reporting, and scheduling.

**3.16.1 Delivery Response Times.** Delivery of spare part requisitions shall be made by the Contractor within prescribed period listed below. The prescribed period begins at a date To Be Determined (TBD) . The Contractor shall report shipment of requisition to a Government-designated activity.

**3.16.1.1 Issue Priority Group One.** Priority 1 through 3 requisitions, including Casualty Report (CASREP), shall be shipped fastest traceable means and received by continental U.S. (CONUS) activities within two working days. Material bound for out continental U.S. (OCONUS) activities shall be marked with a 1378 sticker and received at a Point of Embarkation (POE) to the Navy Transportation System within two working days.

**3.16.1.2 Issue Priority Group Two.** Priority 4 through 8 requisitions shall be received by CONUS activities within seven working days. Material bound for OCONUS activities shall be received at a POE to the Navy Transportation System within seven working days.

**3.16.1.3. Issue Priority Group Three.** Priority 9 through 15 requisitions shall be received by CONUS activities within 15 working days. Material bound for OCONUS activities shall be received at a POE to the Navy Transportation System within 15 working days. The Contractor will discuss efforts to attempt to satisfy these requisitions at program reviews.

**3.16.2 Parts Availability.** The Contractor shall be responsible for maintaining a 85% fill rate within the time frames listed in paragraph 3.10.5.1 (The fill rate means the percentage of the total quantity of items ordered which are received within the specified response time). If a part is backordered, the Contractor shall submit a DVD Backordered Requisition Report to include requisition number, NSN, and estimated date of shipment.

**3.16.3 Reporting.** The Contractor shall interface with the existing Government transaction item reporting system for receiving requisitions, reporting shipments, and asset visibility.

**3.16.4 Inventory.** The Contractor will retain title and control of the full inventory of

wholesale system assets. Transfer to the Navy occurs upon shipment of the material Freight on Board (FOB) from Destination by the Contractor. Title of NRFI assets received from Government activities will transfer to the Contractor upon Contractor acknowledging receipt.

The Contractor shall either repair and/or overhaul articles to RFI condition or replace returned articles with equivalent articles in RFI condition. The determination as to repair, overhaul, or replace being solely at the discretion of the Contractor to achieve the stated availability and delivery times. The methods, procedures, and processes employed by the Contractor to effect repairs shall be determined by the Contractor. In the event that articles are returned as NRFI under this contract, and inspection and test by the Contractor reveals No Evidence Of Failure, a report identifying the item and turn-in activity will be submitted monthly to a TBD point of contact which will include NSN and activity which submitted the item.

**3.16.5 Support Transition.** The Contractor shall propose appropriate contract termination terms and condition that address:

- Completing work in progress
- Return of Government inventory
- Advance notification of Contractor or Government intent to exit
- Transfer of technical data
- Government purchase of Contractor Furnished Material (CFM)
- Contractor's role in selecting and developing an alternate source
- Other assistance deemed appropriate

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## **APPENDIX A**

### **Acronyms & Definitions**

The acronyms and abbreviations used in this document and their definitions are described in the following list.

2M	Miniature/Micro-Miniature
ACD	Allocated Configuration Documentation
ACSN	Advance Change/Study Notices
ADS	Advanced Display System
AIEWS	Advanced Integrated Electronic Warfare System
ANSI	American National Standards Institute
ASMD	Anti-Ship Missile Defense
ASME	American Society of Mechanical Engineers
ASTM	American Society of Technical Managers
ASQC	American Society for Quality Control
ATD	Advanced Technology Demonstration
ATE	Automatic Test Equipment
ATIS	Advanced Technical Information Support
AWS	AEIS Weapons System
BAA	Broad Agency Announcement
BAFO	Best And Final Offer
BFTT	Battle Force Tactical Trainer
BGIMA	Battle Group Intermediate Maintenance Activity
BIT	Built In Test
BOM	Bill Of Material
CAD	Computer Aided Design
CAIV	Cost As an Independent Variable
CALS	Continuous Acquisition and Life Cycle Support
CAP	Control And Processing
CASE	Computer Aided System Engineering
CASREP	Casualty Report
CASS	Consolidated Automated Support System
CCA	Circuit Card Assembly
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CFM	Contractor Furnished Material
CI	Configuration Item

CM	Configuration Management
CMM	Capability Maturity Model
CMP	Configuration Management Plan
CLIN	Contract Line Item Number
CONUS	Continental United States
COTS	Commercial Off The Shelf
CPAF	Cost Plus Award Fee
CPI	Cost Performance Index
CPM	Critical Path Method
CPR	Cost Performance Report
CRD	Contractor Repair Depot
CS	Combat System
CS	Computer Software
CSA	Configuration Status Accounting
CSCI	Combat System Configuration Items
CSD	Computer Software Documentation
CSFAB	Combat System Functional Allocation Board
CSP	Commercial Stock Point
CSURV	Counter-Surveillance
CTTG	Counter-Targeting
CWBS	Contract Work Breakdown Structure
DCN	Design Change Notice
DF	Direction Finding
DFARS	Defense Federal Acquisition Regulation Supplement
DID	Data Item Description
DLS	Decoy Launching System
DOD	Department of Defense
DT	Developmental Testing
DVD	Direct Vendor Delivery
E <sup>3</sup>	Electromagnetic Environmental Effects
E&MD	Engineering and Manufacturing Development
EA	Electronic Attack
ECN	Engineering Change Notice
ECP	Engineering Change Proposal
EDM	Engineering Development Model
EIA	Electronics Industry Association
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EMS	Electromagnetic Susceptibility
EMV	Electromagnetic Vulnerability



ES	Electronic Warfare Support
ESD	Electrostatic Discharge
ESS	Environmental Stress Screening
EV	Earned Value
EW	Electronic Warfare
FAR	Federal Acquisition Regulation
FAT	First Article Testing
FCA	Functional Configuration Audit
FCD	Functional Configuration Documentation
FMECA	Failure Modes, Effects and Criticality Analysis
FPI	Fixed Price Incentive
FQT	Formal Qualification Test
FTA	Fault Tree Analysis
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GFP	Government Furnished Property
GPETE	General Purpose Electronic Test Equipment
GPR	Government Purpose Rights
HAR	Hazard Action Report
HARDMAN	Hardware and Manpower
HDP	Hardware Development Plan
HE	Human Engineering
HEPP	Human Engineering Program Plan
HGHS	High Gain High Sensitivity
HMI	Human Machine Interface
HPOI	High Probability of Intercept
HWCI	Hardware Configuration Item
ICAPS	Interactive Computer Based Provisioning System
ICD	Installation Control Document
ICDS	Integrated Combat Direction System
ICP	Item, Component, or Process
IDD	Interface Design Document
IEEE	Institute of Electrical and Electronic Engineers
IETM	Interactive Electronic Technical Manuals
ILS	Integrated Logistics Support
IMA	Intermediate Maintenance Activity
IMP	Integrated Management Plan
IMPS	Integrated Management Plan Schedule
IMR	Integrated Management Report

INCO	Installation and Check Out
IPPD	Integrated Product and Process Development
IPR	In Process Review
IPT	Integrated Product Team
IR	Infrared
IRS	Interface Requirement Specification
ISD	Integrated Ship Defense
ISDS	Integrated Ship Defense System
ISEA	In Service Engineering Agent
ISP	Integrated Support Plan
IV&V	Independent Verification & Validation
JETDS	Joint Electronics Type Designation System
JHU/APL	Johns Hopkins University / Applied Physics Laboratory
LAN	Local Area Network
LCC	Life Cycle Cost
LCCB	Local Configuration Control Board
LCN	LSA Control Numbers
LINK	LAN Integrated Network Kernel
LMI	Logistics Management Information
LORA	Level of Repair Analysis
LRIP	Low Rate Initial Production
LRU	Lowest Replaceable Unit
LSA	Logistics Support Analysis
LSAR	Logistics Support Analysis Record
LTAP	Lowest Technically Acceptable Proposal
MAM	Maintenance Assist Module
MCMTOMF	Mean Corrective Maintenance Time Operational Mission Failures
MIL-D	Military Drawing
MIL-M	Military Manual
MIL-PRF	Military Performance Specification
MIL-STD	Military Standard
MIL-T	Military Technical Data Package
MIP	Maintenance Index Pages
MPT	Manpower, Personnel and Training
MRC	Maintenance Repair Card
MTBOMF	Mean Time Between Operational Mission Failures
MTBOMFHW	Mean Time Between Operational Mission Failures, Hardware
MTBOMFSW	Mean Time Between Operational Mission Failures, Software

MTP	Master Test Plan
N&IEC	Natural and Induced Environmental Compatibility
NAVICP	Navy Inventory Control Point
NDI	Non-Developmental Item
NOR	Notice of Revisions
NRFI	Not Ready For Issue
NSN	National Stock Number
OCONUS	Out Continental United States
ORDALT	Ordinance Alteration
O&SHA	Operating and Support Hazard Analysis
OT	Operational Testing
P&CR	Performance and Compatibility Requirements
PCA	Physical Configuration Audit
PCD	Physical Configuration Documentation
PCO	Procurement Contracting Officer
PCP	Project Control Panel
PDR	Preliminary Design Review
PHA	Preliminary Hazard Analysis
PHL	Preliminary Hazard List
PMR	Program Management Review
PMS	Planned Maintenance System
POC	Point Of Contact
POE	Point of Embarkation
PPL	Provisioning Parts List
PR	Problem Report
PRR	Production Readiness Review
PTD	Provisioning Technical Document
QA	Quality Assurance
QAS	Quality Assurance System
R&M	Reliability & Maintainability
RADHAZ	Radiation Hazard
RCM	Reliability Centered Maintenance
RDD	Requirements Driven Design
RF	Radio Frequency
RFD	Request for Deviation
RFI	Ready for Issue
RFP	Request For Proposal
RFW	Request for Waiver

RV	Rental Value
SAR	Safety Assessment Report
SBIR	Small Business Innovative Research
SCN	Specification Change Notice
SDD	Software Design Description
SDP	Software Development Plan
SDR	System Design Review
SE	System Engineering
SECNAV	Secretary of the Navy
SEI	Specific Emitter Identification
SEMP	System Engineering Management Plan
S <sub>p</sub> EMP	Specialty Engineering Management Plan
SHA	System Hazard Analysis
S <sup>2</sup> IP	System/Subsystem Integration Plan
SNLR	Specifically Negotiated License Rights
SOW	Statement Of Work
SPETE	Special Purpose Electronic Test Equipment
SPS	Software Production Specification
SPTD	Supplementary Provisioning Technical Document
SRA	Ship Replaceable Assembly
SRR	System Requirements Review
SRS	Software Requirement Specification
SSA	Software Support Activity
SSAP	Software Support Activity Plan
SSDD	System/Subsystem Design Description
SSP	System Safety Program
SSPP	System Safety Program Plan
SSR	Software Specification Review
SSS	System/Subsystem Specification
STANAG	Standard Agreement
STP	Safety Test Plan
SWHA	Software Hazard Analysis
T&E	Test & Evaluation
TBD	To Be Determined
TCPI	To Complete Performance Index
TD	Technical Data
TDP	Technical Data Package
TIMS	Training Integration Management System
TPM	Test Performance Measures
TQM	Total Quality Management
TRB	Test Review Board

TRR	Test Readiness Review
V&V	Validation and Verification
VDD	Version Description Document
WARM	Wartime Reserve Modes
WASP	Wrap Around Simulation Program
WBS	Work Breakdown Structure
WSESRB	Weapon System Explosives Safety Review Board

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